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II. AMENDMENT TO THE CLAIMS

Amendments Made Herein and Summary of Status of Claims

- **Please cancel claim 13, without prejudice.**

Claims 1-12, 14-29, and 31-32 are pending after the amendments set forth below are entered. Claims 1-12, and 14-29 have been amended without disclaimer. Claims 31 and 32 have been newly added. No new matter has been introduced with this amendment. The claims are fully supported by the instant disclosure.

Statement with Respect to Scope of Amended and Non-Amended Claims

Revisions to the claim set is made in order to streamline prosecution of this case in order to obtain early allowance of embodiments that are presently anticipated to be of commercial significance. It is asserted that claim revisions are not made for a purpose of patentability. Any amendment, cancellation, withdrawal or addition made herein with respect to the claims should not be construed in any manner as indicating Applicants' surrender of any subject matter of the application, or surrender of any equivalent to any element asserted in one or more claims. Any narrowing which may be evinced with respect to subject matter covered by the claims as a whole, or by one or more claims of the appended claims whether amended, re-represented, or new, when compared to claims previously in the application, should not be interpreted as indicating that the Applicants have generally disclaimed the territory between the original claimed subject matter and the amended claimed subject matter. Amended claims elements are to be construed to include substantial equivalents known to those of ordinary skill in the art. Applicants assert that any amendments transacted herein are made without prejudice and reserve all rights to prosecute any canceled claims, and claim structures preceding any amendment to a particular claim, and other disclosed (but not presently claimed) embodiments in the application, in future continuation applications, divisional applications, continuation-in-part applications, continuing prosecution applications, requests for continuing examination, re-examination applications and any other application claiming priority to the present application.

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▪ **COMPLETE LIST OF CLAIMS THAT ARE OR HAVE BEEN BEFORE THE OFFICE
AFTER ENTRANCE OF THE AMENDMENTS MADE HEREIN**

The following claims constitute a complete list of claims that are or have been before the office after entrance of the amendments made herein. Amendments to the claims are indicated in accord with Revised 37 C.F.R. §1.121. In accord with such regulation, the listing of claims set forth below replaces all prior versions, and listings, of claims in the application, with cancelled and not entered claims not being re-presented:

--CLAIMS AS PENDING IN THE APPLICATION WITH AMENDMENTS MADE
HEREIN START ON THE NEXT PAGE--

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1. **(CURRENTLY AMENDED)** ~~[[A]]~~ An ecologically friendly process for oligomerizing ethylene ~~the preparation of~~ to low molecular weight linear alpha olefins ranging from having 4 to 24 carbon atoms, comprising oligomerizing ethylene in an inert aliphatic or an alkyl substituted aromatic solvent in the presence of a catalyst comprising including at least two components, a first component selected from the group consisting of zirconium alkoxide and zirconium aryloxide prepared in association with free alcohol in at a ratio of about 1 : 0.33 to about 1 : 2.3, and a second component selected from the group consisting of an alkyl aluminum and/or alkyl aluminum halide.
2. **(CURRENTLY AMENDED)** ~~[[A]]~~ The process as claimed in claim 1 wherein the process is carried out under a continuous supply of ethylene at a pressure range between 18 and 38 kg/cm² and under agitation.
3. **(CURRENTLY AMENDED)** ~~[[A]]~~ The process as claimed in claim 1 wherein the process is performed in semi-continuous mode with ethylene being fed continuously during each period of the process sufficient for preparing a batch of the olefins.
4. **(CURRENTLY AMENDED)** ~~[[A]]~~ The process as claimed in claim 1 wherein the catalyst system comprises of at least two components, the first component comprises comprising of zirconium (IV) alkoxide or carboxylate prepared in alcohol at the ratio ranging from 1 : 0.33 to 1 : 1.23; and the second component comprises comprising of triethylaluminum and/or ethylaluminum sesquichloride.
5. **(CURRENTLY AMENDED)** ~~[[A]]~~ The process as claimed in claim 1 wherein the catalyst system is of the formula $Zr(OR)_4-Et_3Al$ wherein R is alkyl or aryl.
6. **(CURRENTLY AMENDED)** ~~[[A]]~~ The process as claimed in claim 1 wherein the catalyst system is of the formula $Zr(OR)_4-Et_3Al_2Cl_3$ wherein R is alkyl or aryl.

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7. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein the catalyst system is of the formula $\text{Zr(OR)}_4\text{Et}_3\text{Al}$ and [[/or]] $\text{Zr(OR)}_4\text{Et}_3\text{Al}_2\text{Cl}_3$ wherein R is alkyl or aryl.
8. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 5 wherein the Et_3Al component is reacted with the Zr(OR)_4 component in the mole ratio of 10:1 to 60:1.
9. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 6 wherein the $\text{Et}_3\text{Al}_2\text{Cl}_3$ component is reacted with the Zr(OR)_4 component in the mole ratio of 10:1 to 60:1.
10. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 7 wherein the Et_3Al and/or $\text{Et}_3\text{Al}_2\text{Cl}_3$ component is reacted with the Zr(OR)_4 component in the mole ratio of 10:1 to 60:1.
11. (CURRENTLY AMENDED) [[A]] The process as claimed in claim [[4]] 1 wherein the zirconium alkoxide component is in association with the free alcohol in a concentration ratio range of 1:0.33 to 1:1.3 and admixed to the second catalytic component.
12. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 7 wherein ~~when both Et_3Al and $\text{Et}_3\text{Al}_2\text{Cl}_3$ are used,~~ the Et_3Al component diluted in solvent is initially charged into the reactor and then $\text{Et}_3\text{Al}_2\text{Cl}_3$ and other catalyst components are added therein.
13. (CANCELED)
14. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein the oligomerization is carried out at a temperature in the range of 80°C to 140°C.
15. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein, the process is carried out for a time period in the range of 1 hour to 3 hours.
16. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein, the solvent used is selected from the group consisting of: cyclohexane, toluene and n-octane.

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17. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 2 wherein the oligomerization reaction is carried out at an agitator speed of 300 to 1000 rpm.
18. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein, the zirconium component is selected from the group consisting of zirconium tetra cresylate, zirconium tetra dimethyl phenolate, zirconium tetra n-butoxide, zirconium tetra iso-propoxide, zirconium tetra n-propoxide, zirconium tetra butyrate and zirconium tetra isobutyrate, in association with an alcohol at a ratio of 1:0.33 to 1:1.23.
19. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 1 wherein said catalyst includes a thiophene as a third component to reduce or limit chain growth.
20. (CURRENTLY AMENDED) [[A]] An ecologically friendly process for oligomerizing ethylene the preparation of to low molecular weight linear alpha olefins ranging from having 4 to 24 carbon atoms, comprising oligomerizing ethylene in an inert aliphatic or alkyl-substituted aromatic solvent in the presence of a catalyst $Zr(OR)_4-Et_3Al$ and/or $Zr(OR)_4-Et_3Al_2Cl_3$, wherein $Zr(OR)_4$ is prepared in association with an alcohol at a mole ratio of 1: 0.33 to 1: 1.23, wherein R is alkyl or aryl, and wherein ethylene is added to the catalyst at a pressure is in the range of 18 to 38 kg/cm², and wherein the oligomerization proceeds at a temperature in the range of 80°C to 140°C for from 1 hour to 3 hours.
21. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 20 47, wherein the mole ratio of Et_3Al and/or $Et_3Al_2Cl_3$ to $Zr(OR)_4$ is 10:1 to 60:1.
22. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 20 47 wherein the oligomerization reaction of ethylene is carried out at an agitator speed of 300 to 1000 rpm.
23. (CURRENTLY AMENDED) [[A]] The process of ethylene process as claimed in claim 20 47 wherein said catalyst includes a thiophene as a third component to reduce or limit chain growth.
24. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 20 47 wherein said inert solvent is selected from the group consisting of: toluene, n-Octane and cyclohexane.

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25. (CURRENTLY AMENDED) [[A]] An ecologically friendly process for oligomerizing ethylene the preparation of to low molecular weight linear alpha olefins ranging from having 4 to 24 carbon atoms, comprising oligomerizing ethylene in an inert aliphatic or aromatic solvent in the presence of a catalyst $Zr(OR)_4-Et_3Al_2Cl_3$; wherein the $Zr(OR)_4$ component is prepared in association with an alcohol at a mole ratio of 1: 0.33 to 1: 1.23, wherein R is alkyl or aryl, and wherein ethylene is added to the catalyst at a pressure is in the range of 18 to 38 kg/cm², and wherein the oligomerization proceeds at a temperature in the range of 80°C to 140°C for from 1 hour to 3 hours.
26. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 25, wherein the mole ratio of $Et_3Al_2Cl_3$ to $Zr(OR)_4$ is 10:1 to 60:1.
27. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 25 wherein the reaction is carried out at an agitator speed of 300 to 1000 rpm.
28. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 25 wherein said catalyst system includes a thiophene as a third component to reduce or limit chain growth.
29. (CURRENTLY AMENDED) [[A]] The process as claimed in claim 25 wherein said solvent is selected from the group consisting of: toluene, n-Octane and cyclohexane.
30. (CANCELED)
31. (NEW) An ecologically friendly process for oligomerizing ethylene to low molecular weight linear alpha olefins ranging from 4 to 24 carbon atoms, comprising the steps of:
- (a) charging a reactor with a catalytic component consisting of alkyl aluminum in an inert aliphatic or alkyl substituted aromatic solvent;
 - (b) admixing into the reactor another catalytic component consisting of a mixture of an alkyl aluminium halide and a zirconium(IV) alkoxide.alcohol preparation, wherein the mole ratio of zirconium compound to alcohol ranges between 1:0.33 and 1:1.23; in the same solvent used in step (a) at an agitation set at a speed of 300 to 1000 rpm;

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(c) heating the combined catalytic components of steps (a) and (b) to a temperature ranging from 80 to 140°C;

(d) continuously feeding ethylene into the combined catalytic components so as to form linear C₄ to C₂₄ alpha olefin products; and

(e) isolating the olefin products by quenching the catalysts with an alkaline solution followed by water wash and a final recovery by distillation.

32. (NEW) The process of claim 31 wherein the zirconium (IV) alkoxide alcohol preparation consists of Zr(OBu)₄.(BuOH), having a ratio of 1:0.33 to 1:1.23.